



Incidental findings during degenerative intervertebral disc disease evaluation at magnetic resonance imaging of the lumbar spine

Ziyad A Almushayti¹✉, Fahad M Alshehri², Hassan A Alwadaani³, Bayan S Alsaqaby⁴, Waad F Almutairi⁵, Anas W Shuwail⁵, Nouf S Almutairi⁵

¹Assistant Professor, Department of Radiology, College of Medicine, Qassim University, Buraydah, Saudi Arabia

²Associate Professor, Department of Radiology, College of Medicine, Qassim University, Buraydah, Saudi Arabia

³Consultant radiologist, Department of Radiology, Prince Mohammed bin Nasser Hospital, Jazan, Saudi Arabia

⁴Medical Student, College of Medicine, Qassim University, Buraydah, Saudi Arabia

⁵Medical intern, College of Medicine, Qassim University, Buraydah, Saudi Arabia

✉ **Corresponding author:**

Assistant Professor, Department of Radiology, College of Medicine, Qassim University, Buraydah, Saudi Arabia;

Email: ziyadalmushayti@qu.edu.sa

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ABSTRACT

Objective: To assess the incidence and kinds of incidental findings of the lumbar spine during Magnetic Resonance Imaging (MRI) evaluation for degenerative intervertebral disc disease in Qassim region, Saudi Arabia. **Methods:** This cross sectional study included a total of 2646 patients (male-to-female ratio, 1836:810; age range, 21–73 years) with clinically suspected intervertebral disc degeneration who underwent MRI of the lumbar spine and evaluated by the consultant radiologists for the presence of any incidental findings such as hemangioma, Tarlov, lumbosacral transitional vertebrae, and spina bifida occulta. The analysis was carried out using the chi-square test. **Results:** A total of 1134 patients (42.8 %) had incidental findings. Hemangioma was the most common finding accounting for 20.4% of cases, followed by Tarlov cyst and lumbosacral transitional vertebra were about 8.16%. Lastly, 6.1% of cases gave an incident for spina bifida occulta. Hemangioma, Tarlov cyst, and spina bifida occulta were more common among females. At the same time, the lumbosacral transitional vertebrae were more in males. The current study demonstrated that the incidental findings became more frequent within middle age (36–50 years). **Conclusion:** incidental findings are mostly benign lesions found at lumbar spine MRI during degenerative intervertebral disc disease evaluation. Some of them have association with gender. The majority of the incidental findings in our study were observed in the 3rd, 4th and 5th decades of life. Discovery of the incidental findings at lumbar spine MRI helps diagnose lesions not related to the presumed disease.

Keywords: Degenerative intervertebral disc disease, incidental findings, MRI, hemangioma, and Tarlov cyst.

1. INTRODUCTION

Lumbar MRI is an investigation performed for patients with low back pain and sciatica (Samartzis et al., 2015). In some of these patients, we may find incidental findings. We mean that incidental findings are a lesion discovered incidentally by magnetic resonance imaging (MRI) or any other imaging modality that we performed on a patient for an unrelated reason (Park et al., 2011; Hartman et al., 2018). Many incidental findings can found on MRI of the lumbar spine during an evaluation for suspected intervertebral disc degeneration. These incidental findings with MRI evaluation of the lumbar spine are classified as spinal and extraspinal (Park et al., 2011). Our study looked for spinal abnormalities only and excluded incidental findings related to other organs. The incidental spinal findings are further classified as vertebral and intraspinal. The incidental findings within the vertebrae are commonly Hemangiomas, transitional vertebra, and spina bifida occulta. Intraspinal lesions include the Tarlov cyst. In the literature, few studies discuss incidental spinal findings at lumbar MRI. Our study evaluated incidental findings in patients with suspected degenerative intervertebral disc disease who go through lumbar spine MRI and assist in diagnosing lesions not related to the alleged disease.

2. MATERIALS AND METHODS

Case selection

A cross-sectional study was performed on a total number of 2646 patients; 1836 males (69.38%) and 810 females (30.61%) with ages ranging from 21 to 73 years old distributed as less than or equal to 35 years, 36-50 years, and above 50 years. The study was carried out in Qassim region at Qassim National Hospital, Buraydah, Saudi Arabia. We included patients who underwent MRI imaging of the lumbar spine for suspected degenerative intervertebral disc disease between January 2015 and August 2020. The majority of patients have been complaining of back pain +/- sciatica. Oral and written informed consents were obtained from participants. We excluded patients who had another history like metastasis or trauma from the study.

Image analysis

The MRI images were evaluated by consultant radiologists for the presence of any incidental findings. We defined incidental findings as the presence of any abnormal finding unrelated to examination purpose. Many incidental findings were observed which include hemangioma, Tarlov cyst, spina bifida, and lumbosacral transitional vertebrae (Figures 1, 2 & 3). Our study used patient demographic data and classified them according to gender and age groups as follows; ≤ 35 years, 36 – 50 years, and older than 50 years.



Figure 1 Sagittal (A) T2 weighted image and (B) T1 weighted image reveal vertebral hemangioma (arrows).



Figure 2 Sagittal (A) T2 weighted image and (B) T1 weighted image reveal Tarlov cysts in sacrum (arrows).

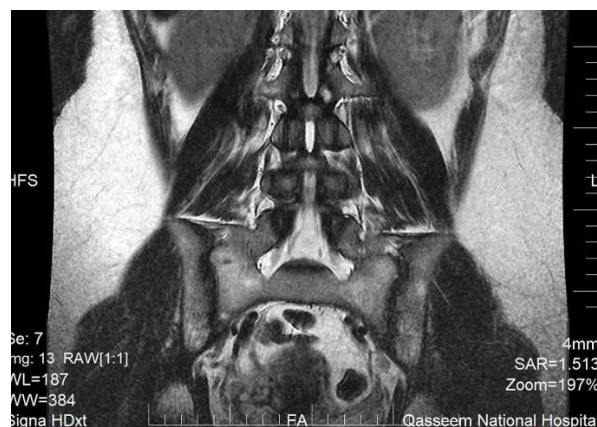


Figure 3 Coronal T2 weighted image shows the L5 transverse process fuses with the sacrum (lumbosacral transitional vertebra).

MRI parameters

The examinations were done on a 1.5 Tesla magnet (General electronic) using the same protocol. T1 weighted image (T1WI) and T2 weighted image (T2WI) sequences were obtained in the axial and sagittal planes. Also, Short Tau Inversion Recovery (STIR) in the sagittal plane and coronal plane T2WI sequences were performed.

Statistical analysis

Frequency distributions calculated. The chi-square test was used to analyze the relationship between incidental findings and patient characteristics. Also, a p value < 0.05 was kept in mind to indicate statistical significance. Moreover, the presence of each incidental finding was analyzed in relation to patient age (≤ 35 , 36 – 50, and > 50) and gender.

3. RESULTS

In Our Study, 2646 cases went under MRI of the lumbar spine as part of the evaluation of clinically suspected degenerative intervertebral disc disorder; 1836 males (69.38 %) and 810 females (30.61%), 1134 (42.8 %) of them, 486 (18.36 %) males and 648 (24.48 %) females had Incidental findings. Hemangioma was the commonest incidental finding (540 cases, 20.4%), then Tarlov cyst and lumbosacral transitional vertebra were about 8.16%, which means 216 cases of each of them. Finally, 162 cases gave an incident for spina bifida occulta 6.1%. Hemangioma, Tarlov cyst, and spina bifida occulta were more in females, whereas the lumbosacral transitional vertebrae were more in males (Table 1).

Table 1 Incidence of Incidental Findings Categorized by Sex

Gender	Hemangioma	Tarlov Cyst	Spina Bifida Occulta	Lumbosacral transitional Vertebra	Total number	percentage
Male	216	54	54	162	486	18.36 %
Female	324	162	108	54	648	24.48 %
P	0.024	0.044	0.162	0.799		
Total number	540	216	162	216	1134	42.8 %
percentage	20.4%	8.16%	6.1%	8.16%	42.8 %	

The incidence of incidental findings of the lumbar spine at MRI categorized by age is shown (Table 2). Our study showed that the incidental findings became more frequent within 36 to 50 years old with a number of 540 cases (20.4%). While 432 cases (16.3%) below the age of thirty-five. Simultaneously, there are 162 cases (6.1 %) of incidental findings above the age of fifty.

Table 2 Incidence of Incidental Findings Categorized by Age

Age (year)	Hemangioma	Tarlov Cyst	Spina Bifida Occulta	Lumbosacral transitional Vertebra	Total number	percentage
≤ 35	216	108	54	54	432	16.3 %
36 – 50	216	108	108	108	540	20.4 %
> 50	108	0	0	54	162	6.1 %
P	0.278	0.575	0.247	0.907		
Total number	540	216	162	216	1134	42.8 %
percentage	20.4%	8.16%	6.1%	8.16%	42.8 %	

4. DISCUSSION

The incidental finding can be found at any part of the body. It's a lesion discovered incidentally in any imaging modality performed on a patient for an unrelated reason (Park et al., 2011). They might be either benign or malignant lesions. The influence of detecting incidental findings on a patient's health outcomes is not certain (Westbrook et al., 1998). Still, it is worth identifying that an incidental finding may be more important than the suspected disease (Kamath et al., 2009). The incidental findings were commonly seen in the lumbar spine like hemangioma, Tarlov cyst, Spina bifida, and lumbosacral transitional vertebrae (Kamath et al., 2009). The vertebral hemangioma is a common occurrence and usually benign course (Doppman et al., 2000). It's a vascular tumor and usually an asymptomatic lesion, but less than 1% of these lesions can cause symptoms due to pathologic fracture or cord compression (Ross et al., 1987). On MRI appears as a high signal intensity lesion in T1WI due to its fat component and bright signal intensity on T2WI, usually greater than on T1WI, due to its high water content (Ross et al., 1987). They occur slightly more in women (Barzin & Maleki, 2009). In our study, hemangioma was the most common finding, 20.4%, and it was more common among female patients and the less than 50 years old age group.

Tarlov cysts are cerebrospinal fluid (CSF) filled sacs of the nerve root sheath most often found in the sacral region (Park et al., 2011). Most of these cysts are asymptomatic but sometimes can cause neurological dysfunction and pain (Voyadzis et al., 2001). It appears on MRI as very thin-walled CSF intensity simple cystic structures closely related to sacral and lower lumbar nerves. In our study, Tarlov cysts accounted for 8.16% of cases, and it was more common among female patients and less than 50 years old age group. Spina bifida occulta is a posterior midline defect of the vertebral arch because of fusion failure (Levy & Freed, 1973). In our study, spina bifida was about 6.1 % of cases, and it was more common among female patients and 36-50 years old age group. Lumbosacral transitional vertebrae is an elongated transverse process of the last lumbar vertebra fuses with a varying degree to the sacral segment and its congenital spinal anomalies (Hughes & Saifuddin, 2004). Our study accounted for 8.16 % of cases, and it was more common among male patients and 36-50 years old age group.

Our study of incidental findings at lumbar MRI of patients with suspected degenerative disc disease showed 42.8 % had Incidental findings. The frequency of incidental findings in this study became more in the 36 to 50 years old age group. Regarding relation to sex, hemangioma, Tarlov cyst, and spina bifida occulta were more in females. At the same time, the lumbosacral transitional vertebrae were more in males. The radiologists and referral physicians should be familiar with these incidental findings.

5. CONCLUSION

Incidental findings are common to be found at lumbar spine MRI during degenerative intervertebral disc disorder evaluation. Most of them are benign, and some were associated with sex. In our study, the majority of the incidental findings were observed in age's between 35 to 50 years. Detecting incidental findings in lumbar spine MRI helps in diagnosing lesions not related to the suspected disease.

Abbreviations

MRI: Magnetic Resonance Imaging
 T1WI: T1 weighted image
 T2WI: T2 weighted image
 STIR: Short Tau Inversion Recovery
 CSF: Cerebrospinal fluid

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Author Contributions

All authors contributed to the research and/or preparation of the manuscript.

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Conflict of Interest

The authors declare no conflict of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval

The study was ethically approved by Sub-committee of Health Research Ethics, Deanship of Scientific Research, Qassim University, Saudi Arabia under the approval code No.:- (19-14-14).

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Barzin M, Maleki I. Incidence of vertebral hemangioma on spinal magnetic resonance imaging in Northern Iran. *Pak J Biol Sci.* 2009; 12(6):542-4.
2. Doppman JL, Oldfield EH, Heiss JD, et al. Symptomatic vertebral hemangiomas: treatment by means of direct intralesional injection of ethanol. *Radiology.* 2000; 214(2):341-348.
3. Hartman J, Granville M, Jacobson RE. Two Cases with Incidental Finding of Large Asymptomatic Intradural Lumbar Tumors. *Cureus.* 2018; 10(10):e3446.
4. Hughes RJ, Saifuddin A. Imaging of lumbosacral transitional vertebrae. *Clin Radiol.* 2004; 59(11):984-991.
5. Kamath S, Jain N, Goyal N, Mansour R, Mukherjee K, et al. Incidental findings on MRI of the spine. *Clin Radiol* 2009; 64:353 –361.
6. Levy JI and Freed C. The incidence of cervico-thoracic spina bifida occulta in South African Negroes. *J Anat.* 1973; 114(Pt 3):449-56.
7. Park HJ, Jeon YH, Rho MH, et al. Incidental findings of the lumbar spine at MRI during herniated intervertebral disk disease evaluation. *AJR Am J Roentgenol.* 2011; 196(5):1151-1155.
8. Ross JS, Masaryk TJ, Modic MT, Carter JR, Mapstone T, Dengel FH, et al. Vertebral hemangiomas: MR imaging. *Radiology.* 1987; 165(1):165-169.

9. Samartzis D, Borthakur A, Belfer I, et al. Novel diagnostic and prognostic methods for disc degeneration and low back pain. *Spine J.* 2015; 15(9):1919-1932.
10. Voyadzis JM, Bhargava P, Henderson FC. Tarlov cysts: a study of 10 cases with review of the literature. *J Neurosurg.* 2001; 95(1 Suppl):25-32.
11. Westbrook JI, Braithwaite J, McIntosh JH, et al. The outcomes for patients with incidental lesions: serendipitous or iatrogenic? *AJR Am J Roentgenol.* 1998; 171(5):1193-1196.

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